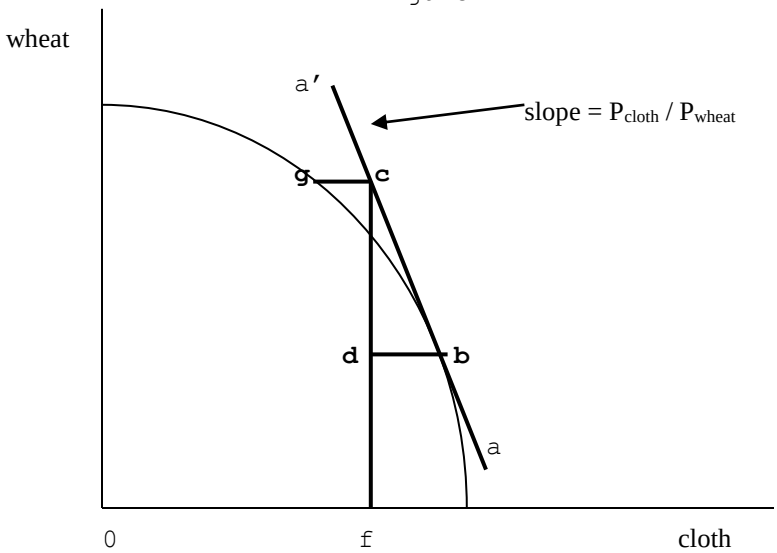
The Gains from Trade: General Equilibrium

The general equilibrium approach to the "gains from trade" relies on the production possibilities curve, previously derived. Essentially, the gain is realized because the country has an opportunity to let its consumption possibilities diverge from its production possibilities. For example, consider Figure 1. The country of that figure can produce wheat and cloth using capital and labor. Because two factors of production are involved, the production possibilities curve is rounded. The country has the opportunity to trade at world prices. Looked at from a market viewpoint, domestic prices will equal world prices, since any divergence would produce immediate production reactions. (If the price of wheat were below the world price within the country, it would pay domestic wheat firms to sell on the world market rather than the domestic market. This would bid up the domestic price of the world level). The point at which the domestic price ratio equals the world price ratio will occur where the slope of the domestic production possibilities curve equals the slope to the world price line (a'a). Moreover, under competitive conditions the economy will produce on the production possibilities curve and not below it. (To be below it would imply either unused capital or labor or inefficient techniques of production, both of which would be eliminated by competition). Hence, only b can be the production point. The consumption possibilities line (a'a) dominates the production possibilities curve because at every point except b, more of one good can be consumed with no loss of consumption of the other good.

Consider the country of Figure 1 that produces at b but consumes at c. It produces more cloth than it consumes so it exports db of cloth. It consumes more wheat than it produces so it imports cd of wheat. (We know that db cloth can be exchanged for cd wheat since these amounts make up the slopes of the world price line). The country is better off at c than it would be on the production possibilities line. If it wanted to isolate itself from trade and consume the same amount of cloth as at point c (of cloth), it would be forced to reduce wheat consumption by ce. If it tried to keep wheat consumption as at point c, it would be forced to cut cloth consumption by gc.[1]

[1] Despite the "gains" from trade as described above, we really can't say in an ultimate sense whether the country is better off due to trade because of the winner/loser problem of Sec. 25.

Figure 1



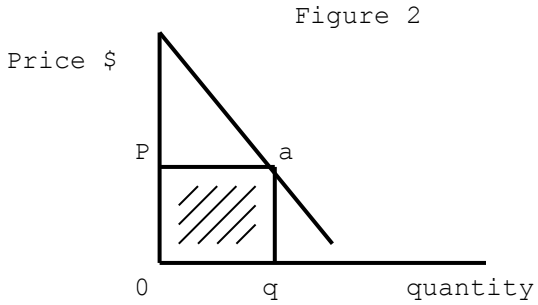
The Gains from Trade: Partial Equilibrium

The gains from trade can be looked at from the partial equilibrium level, i.e., at the level of a particular product. This approach becomes especially useful when tariffs and quotas are considered later in the course. To use partial equilibrium analysis, it is necessary to introduce two concepts: consumers' surplus and producers' surplus.

a) Consumer’s surplus

A typical demand curve is shown on Figure 2. It has the usual downward slope and represents the quantity of a product consumers will want to buy at particular prices. For example, at price OP, consumers will buy Oq of the product. The revenue they will spend = price x quantity = OP x Oq = area of box OPaq.

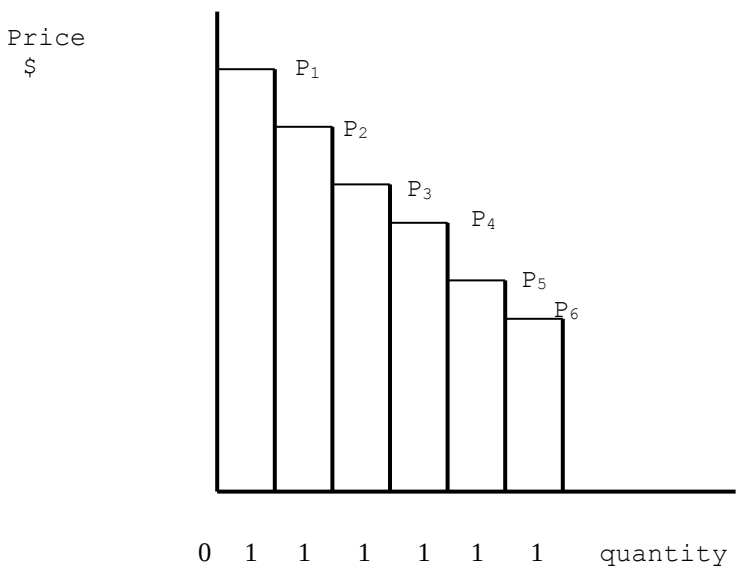
Figure 2



A demand curve such as the one shown can be given a "welfare" interpretation.

Imagine a product produced by a monopoly which is able to "discriminate" in its pricing. (Discriminate means to charge different prices to different consumers for the same product. Example: UCLA sells tickets for cultural events at discount prices to students relative to what the general public is charged. The phone company charges businesses more than residential consumers). Imagine further that the monopolist can discriminate "perfectly" so that it charges each customer the maximum he/she will pay. On Figure 3, the monopolist finds someone just willing to pay P_1 for the first unit, then finds someone just willing to pay P_2 for the second, etc. Obviously, to be able to find out just what people are willing to pay, the monopolist would need to be gifted with ESP.[2]

Figure 3



If the monopoly had simply set the price at P_6 it would have sold the first 6 units but it would have captured only the full value to the sixth customer. The full value to the first 6 consumers is:

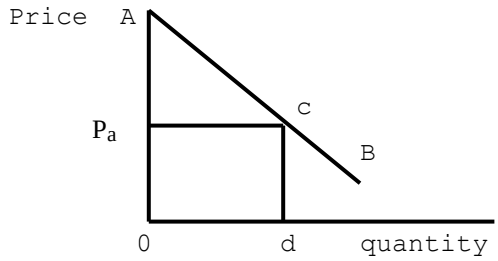
$$(P_1 \times 1) + (P_2 \times 1) + (P_3 \times 1) + (P_4 \times 1) + (P_5 \times 1) + (P_6 \times 1)$$

↑ price ↑ quantity

[2] Discriminating monopolists need to be able to prevent re-sales from those allowed to buy at low prices to those charged prices.

Thus, the area under a demand curve (such as the one formed by connecting the points P_1, P_2, P_3, etc.) can be thought of as the full value of the product to consumers. Normally, firms charge a single price to all consumers so that they do not capture the full value. The uncaptured value, which goes to consumers, is the consumers' surplus.

Figure 4



On Figure 4, a firm faces demand curve AB and charges price = P_a. It charges all customers this price. Thus, the full value to all consumers is OAcd, the revenue obtained by the firm is OP_acd, and the consumers' surplus is AP_ac.[3]

b) Producers' surplus

In a competitive market, firms supply their products according to their marginal cost curves. The industry supply curve is thus the sum of the marginal cost curves for all firms in the industry and represents the industry marginal cost. Marginal cost measures the increment of cost due to producing an additional unit of output. If cost = C and quantity of output = Q, then marginal cost = $\Delta C/\Delta Q$. On Figure 5, a competitive firm has marginal cost curve AB (assumed upward sloping). The market price for the product is P and the firm produces OQ of output, i.e., it produces where price = marginal cost. At outputs below OQ it would pay to expand output since the extra revenue obtained (the price) for each unit would be more than the cost. At outputs above OQ, it would pay to cut back on production since each incremental unit costs more to produce than it fetches in the market.

Marginal cost can be decomposed into discrete units just as the demand curve was. On Figure 6, the first unit costs c_1 the second unit involves additional expenditure of c_2, etc.

[3] There are various objections raised in theoretical economics to the concept of consumers' surplus. However, these need not be of concern to us here. Basically a problem arises because a change in price changes real incomes by some amount.

Figure 5

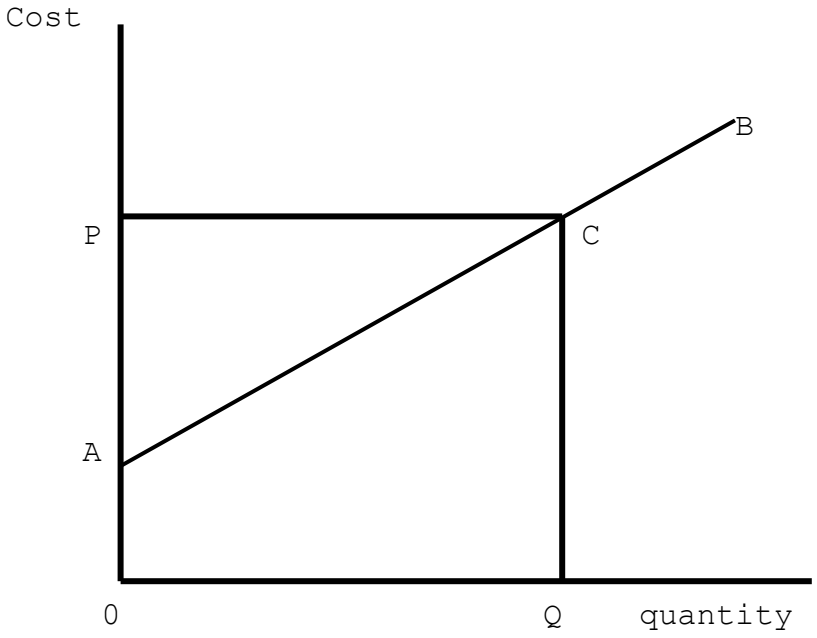
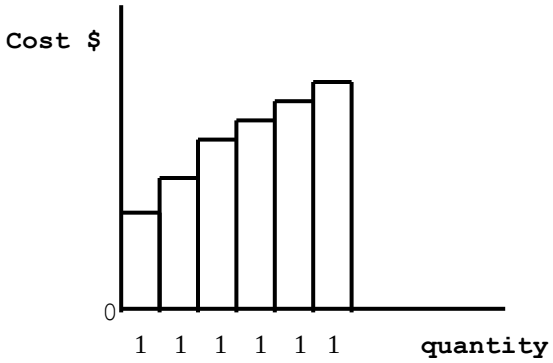


Figure 6



Thus, the cost of producing 6 units is:

$(c_1 \times 1) + (c_2 \times 1) + (c_3 \times 1) + (c_4 \times 1) + (c_5 \times 1) + (c_6 \times 1)$

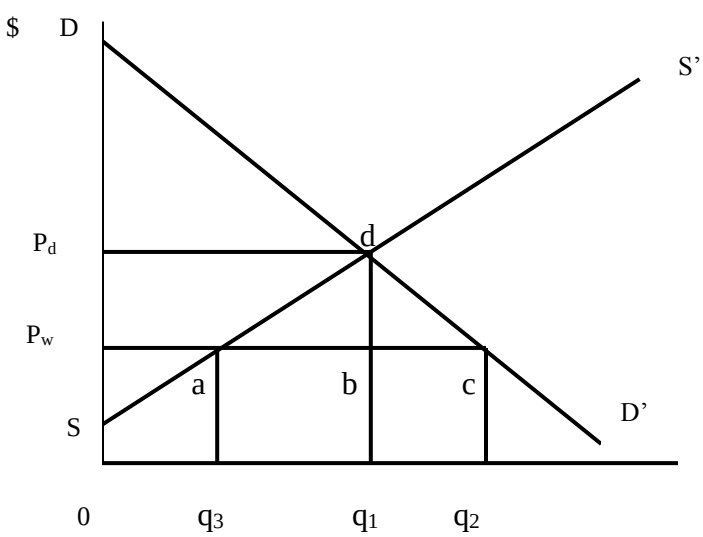
Cost of the unit

Number of units sold

Returning to Figure 5, we see that the area under the marginal cost curve can be interpreted as the total variable costs of production. The firm takes in revenue of OPCQ and bears costs of OACQ. The amount left over (APC) is the producer's surplus for this one firm. (The firm's profits could be determined by subtracting its fixed costs from its surplus). At the industry level the interpretation is the same. If AB of Figure 5 is the industry supply curve, the industry has revenue of OPCQ, bears variable costs of OACQ, and creates a producers' surplus of APC.

c) The Gains from Trade: Imports

Figure 7



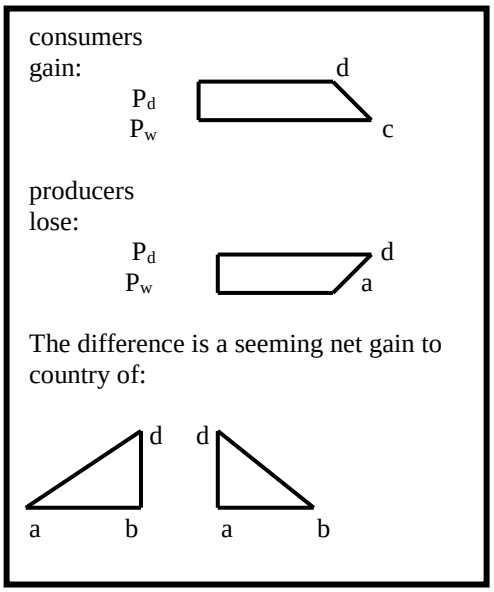


Figure 7 shows classic demand and supply curves. Without trade, the market clears at price = P_d and quantity = q_1. Consumers receive a surplus of P_dDd and producers receive a surplus of SP_dd. The product will be imported if the world price is cheaper than the domestic (no-trade) equilibrium price. In the case shown on Figure 7, the world price P_w is below the domestic price P_d. The world price becomes the price at which the product is traded if free trade is allowed. Consumers increase their demand for the product by bc and producers cut their production by ab. Thus imports of q_3q_2 are required.[4] Producers lose surplus of P_wP_dda but this is more than made up by the gain to consumers of P_wP_ddc. The net gain is represented by the two triangles abd and bdc. The former is a gain from the increased efficiency of the economy in buying from the cheapest source. Before trade, the incremental production q_3q_1 cost q_3adq_1 in resources. Now the expenditure is only q_3abq_1. The gain bdc represents the fact that incremental consumption worth q_1dcq_2 was achieved at a cost of only q_1bcq_2.[5]

d) The Gains from Trade: Exports

An exercise for the student: <u>You</u> draw the diagram so that exports occur. <u>You</u> interpret the gains and losses. Hint: For a product to be exported, what would have to be the relationship between P_w and P_d?

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[4] Strictly speaking, q_3q_2 represents <u>net</u> imports since there is no guarantee (in the absence of transport costs), that Oq_3 is sold domestically. However, even an assumption of minor transport costs will insure that Oq_3 is sold domestically; hence, in what follows we assume that domestic production is first sold at home.

[5] Note again that there are winners and losers in this example. Producers lose; consumers gain. If we sum up the gains and losses, a positive number emerges. But we really can't say whether the nation "as a whole" is better off due to the winner/loser problem of Sec. 25. The problem is that the nation is not a "whole".